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REMARKS

The Examiner rejected claims 1 and 5 under 35 U.S.C. 102(e) as being anticipated by Rothamel (US 6,639,206). Applicant submits that Claims 1 and 5, as amended above, are not anticipated by Rothamel.

Claims 1 and 5 require that the encoder include a drum having a circular cylindrical surface and alternating reflective and non-reflective stripes arranged on that surface. Each stripe must include a portion of the circular cylindrical surface and have a circular cylindrical outer surface with an axis that is coincident with the axis of the drum. In addition, an image of each reflective stripe must be formed on the photodetector with a magnification that depends on the radius of curvature of the circular cylindrical surface.

In making this rejection, the Examiner looks to Figures 1 and 6-7 of Rothamel. In particular, the Examiner identifies surface 5 as the cylindrical surface recited in the claim and element 9 as the first track having reflective stripes 2 and non-reflective stripes 11. The Examiner maintains that the reflective stripes form an image of the first light source (element 1 in the figures) on the photodetector (element 3 in the figures) and that the image has a magnification that depends on the radius of curvature of the cylindrical surface. In addition, the Examiner maintains that the stripes taught in Rothamel form an image of the light source 1 on the photodetector 2. Applicant disagrees.

Rothamel teaches that the reflective stripes are discrete reflectors that are mounted on the surface of a drum that has an axis shown at 8. Rothamel teaches three different forms for the reflectors. The forms shown in Figures 4 and 5 correspond to reflectors that are planar surfaces. In the form shown in Figure 6, the reflectors are convex surfaces, and in the form shown in Figure 7, the reflectors are concave surfaces. The Examiner has not pointed to any teaching that the reflectors have a circular cylindrical outer surface with an axis coincident with the drum. Refer to Figures 6 and 7. Even if the reflectors were circular cylindrical, the reflectors would not have an axis coincident with the drum, since if this were the case, the surface of the reflector would be parallel to the surface of the drum, and this is clearly not the case.

In addition, an image of the reflectors having a magnification determined by the drum diameter is not formed on the photodetector. In the encoder taught by Rothamel, no image of the reflectors is formed, no less an image having a magnification that depends on the drum diameter. In the encoder of Rothamel, the light source is focused to a point on the reflector surface. When the reflector is at the correct point in the rotation of the drum, the reflected light enters the photodetector. Since the entire stripe is not even illuminated, no image of the stripe could be formed on the detector. Furthermore, even if the entire stripe were to be illuminated, the magnification of the image provided by the embodiments shown in Figures 6 and 7 depends on the radius of curvature of the reflecting surface, not the radius of curvature of the drum. The embodiments that utilize planar surfaces do not provide any magnification.

While one could modify the teachings of Rothamel to provide reflectors that satisfy the limitations in question, the mere fact that such a modification is possible is not sufficient to sustain a rejection for anticipation. To sustain a rejection for anticipation, the Examiner has the burden of showing by reference to the cited art each claim limitation in the reference. Anticipation under 35 U.S.C. 102 requires that each element of the claim in issue be found either expressly or inherently in a single prior art reference. *In re King*, 231 USPQ 136, 138 (Fed. Cir. 1986); *Kalman v. Kimberly-Clark Corp.*, 218 USPQ 781, 789 (Fed. Cir. 1983). The mere fact that a certain thing may result from a given set of circumstances is not sufficient to sustain a rejection for anticipation. *Ex parte Skinner*, 2 USPQ2d 1788, 1789 (BdPatApp&Int 1986). "When the PTO asserts that there is an explicit or implicit teaching or suggestion in the prior art, it must indicate where such a teaching or suggestion appears in the reference" (*In re* Rijckaert, 28 USPQ2d, 1955, 1957).

Under the doctrine of inherency, if an element is not expressly disclosed in a prior art reference, the reference will still be deemed to anticipate a subsequent claim if the missing element "is necessarily present in the thing described in the reference...." *Cont'l Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749(Fed. Cir. 1991). "Inherent anticipation requires that the missing descriptive material is 'necessarily present,' not merely probably or possibly present, in the prior art." *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295, 63 USPQ2d 1597, 1599(Fed. Cir. 2002) (quoting *In re Robertson*, 169 F.3d

743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999)). Hence, Applicant submits that Claims 1 and 5 are not anticipated by Rothamel.

The Examiner rejected Claim 2 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Chen (US 6,817,528). Applicant submits that Claim 2, as amended above, is not obvious in view of Rothamel.

As noted above, Rothamel does not teach that an image of the reflective stripes having a magnification that depends on the radius of curvature of the drum is formed on the photodetector. In addition, Rothamel specifically teaches that the light source generates a focused beam of light such that the light emitter in the light source is focused onto the surface of the mirrors. The scheme taught in Rothamel depends on focusing the light on the mirror. Hence, replacing light source 1 with a light source that generates a collimated beam of light would render the invention of Rothamel inoperative. Accordingly, there is also no reasonable expectation of success in making the combination suggested by the Examiner. Accordingly, Applicant submits the Claim 2 is not obvious in view of Rothamel.

The Examiner rejected Claims 3-4 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Suganuma (US 6,448,996). Applicant submits that these claims as amended above are not obvious in view of the cited references.

As noted above, Rothamel fails to teach the image limitation recited in Claim 1. The Examiner has not pointed to any teaching in Suganuma that provides the missing teachings.

The Examiner rejected Claim 6 under 35 U.S.C. 103(a) as being unpatentable over Rothamel. Applicant submits that Claim 6, as amended above, is not obvious in view of Rothamel.

Claim 6 depends from Claim 1 and further requires that the first track lies between the circular cylindrical surface of the drum and the axis of the drum. That is, the track is on the inside surface of a hollow drum. The Examiner admits that Rothamel does not provide the additional teaching but maintains that it would be obvious to provide the teaching since it would lead to a more compact design.

As noted above, Rothamel fails to teach the image limitation recited in Claim 1 from which Claim 6 depends. In addition, the Examiner has not pointed to any suggestion in the art that the encoder head taught in Rothamel and the corresponding stripes could be moved to inside the drum to provide the benefit recited by the Examiner. Hence, Applicant submits that Claim 6 is not obvious in view of Rothamel.

The Examiner rejected Claim 7 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Karim-Panahi (5,438,882). Applicant submits that Claim 7, as amended above, is not obvious in view of the cited references.

Claim 7 depends from Claim 1 and, in addition, requires a second track having reflective stripes on the same circular cylindrical surface with a second light source and photodetector. The Examiner admits that Rothamel does not teach such an arrangement. The Examiner looks to Karim-Panahi as providing the teaching of two tracks on the same surface. The Examiner maintains that it would be obvious to add the second track as taught by Karim-Panahi to the encoder of Rothamel because it would provide more data on the periodic motion of the drum.

First, as noted above, Rothamel fails to teach the image limitation recited in Claim 1 from which Claim 7 depends. Karim-Panahi does not provide the missing limitation. Second, Karim-Panahi teaches using a second track and a processing system for detecting phase shifts between the two tracks to detect distortion of the shaft about which the tracks rotate. The second track does not provide any form of encoding data in Karim-Panahi. In fact, as the Examiner admits in the rejection of Claim 8, Karim-Panahi teaches two tracks in which the width of the stripes in the first track is the same as the width of the stripes in the second track. Rothamel is directed to an encoder for providing position information. Hence, a second track as taught in Karim-Panahi is of no use in the apparatus of Rothamel since it cannot provide additional position information absent some additional teachings, which the Examiner has failed to identify. Accordingly, Applicant submits that Claim 7 is not obvious in view of the cited references.

The Examiner rejected Claim 8 under 35 U.S.C. 103(a) as being unpatentable over Rothamel in view of Karim-Panahi and Cohen (US 4,124,839). Applicant submits that Claim 8, as amended above, is not obvious in view of the cited references.

Claim 8 depends from Claim 7 and further requires that the stripes on the second track have widths that are different from the stripes on the first track. The Examiner admits that the track taught in Karim-Panahi does not have this property. The Examiner looks to Cohen as providing the missing teachings.

First, Applicant repeats the arguments made above with respect to the missing teachings in the combination of Rothamel and Karim-Panahi with respect to Claim 1 from which Claim 8 also depends. Cohen does not provide the missing teachings.

Second, the use of tracks having different track widths in the device of Karim-Panahi leads to an inoperative device. The device taught in Karim-Panahi measures the phase difference between the two tracks. The tracks taught in Karim-Panahi have stripes that are spaced evenly around the track at some notch mark spacing. Each track generates a periodic signal having a frequency that is many times that of the rotational motion of the shaft thereby allowing phase shifts that occur in a time that is much less than the period of rotation of the shaft to be detected. The device taught in Karim-Panahi detects shifts in the phase shift between two cycles of the higher frequency.

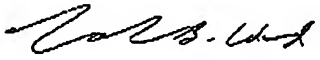
The Examiner attempts to overcome this defect in the Examiner's argument by arguing that one could use two tracks such as those shown in Cohen in the apparatus of Karim-Panahi and still measure a phase shift resulting from a distortion of the shaft. The Examiner argues that the teachings of Karim-Panahi are merely the preferred embodiment and that one reading Karim-Panahi would realize that any pattern of stripes disposed on a track can be compared to a different pattern disposed on the second track and a phase shift between the two patterns determined. The Examiner does not point to any teaching in the art that supports this contention that two tracks having periodic stripes of different widths can be compared with the required accuracy. Basically, the Examiner argues that each of the differently structured tracks generates a signal of the same frequency, namely, the signal generated by one rotation of the shaft. In the case of the tracks taught in Cohen, the first

signal would be N cycles of a sine wave of frequency 2w and N/2 cycles of a sine wave having a frequency w. The Examiner proposes to measure the shift in these two macro signals as opposed to measuring the shift in two cycles of each sine wave. The Examiner has not pointed to any teaching as to how one would make this measurement, since one cycle of a sine wave of frequency w looks just like another cycle of that sine wave. Hence, there is no means of detecting the beginning of the two macro signals proposed by the Examiner absent some additional teachings that the Examiner has not provided.

In addition, it should be noted that Karim-Panahi teaches a device for measuring the vibration of a shaft. The scheme proposed by the Examiner can only measure phase changes that take place on a time scale larger than the rotational period of the shaft. However, such phase changes can be easily measured by counting the number of stripes in a time period equal to the nominal period of rotation of the shaft. Hence, there is no reason to make the alteration proposed by the Examiner. Accordingly, Applicant submits that the Examiner has not made a *primia facia* case for obviousness with respect to Claim 8.

I hereby certify that this paper is being sent by FAX to 571-273-8300.

Respectfully Submitted,



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